ORIGINAL

DEMONSTRATION OF COMPLETION OF REMEDIAL ACTIVITIES/REQUEST TO MODIFY THE CAP AND DRAINAGE LAYER REQUIREMENTS FOR QUARRY NO. 4

Prepared For:

United States Environmental Protection Agency

and

Pennsylvania Department of Environmental Protection

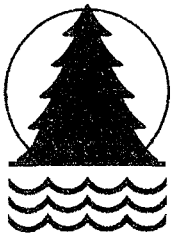
On Behalf Of:

Liberty Property Trust
65 Valley Stream Parkway
Great Valley Corporate Center
Malvern, PA 19355

Prepared By:

Penn Environmental & Remediation, Inc.
2755 Bergey Road
Hatfield, PA 19440

January 24, 2001
4013-2000



Penn E&R
Environmental & Remediation, Inc.
Phone. 215-997-9000 • Fax. 215-822-8575
E-mail mail@penn-er.com

ORIGINAL

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

Liberty Property Trust (LPT) owns the properties located at 2201 and 2301 Renaissance Boulevard in Upper Merion Township, Montgomery County, PA. The 2201 Renaissance Boulevard property was developed by LPT and is currently occupied by an office building, associated parking lots and a storm water detention basin. LPT has also begun development of the adjacent 2301 Renaissance Boulevard property with a second office building, associated parking lots, and two storm water detention basins. Figure 1 shows the location and layout of the two properties, the existing features of 2201 Renaissance Boulevard, and the proposed construction to be implemented on the 2301 Renaissance Boulevard property.

There is a former sand and gravel quarry which was historically filled located on the 2201 Renaissance Boulevard property. This quarry is known locally as Quarry No. 4. The approximate boundaries of Quarry No. 4, in relationship to the existing structures on the 2201 property and the proposed structures to be constructed on the 2301 property, are shown on Figure 1.

The United States Environmental Protection Agency (USEPA) recently completed a Remedial Investigation/Feasibility Study (RI/FS) of the Crater Resources Superfund site (Crater). Quarry Nos. 1 through 3, which received Waste Ammonia Liquid (WAL), were the primary focus of the RI/FS. These quarries are located off-site and south and west of the 2201 and 2301 properties. The locations of Quarry Nos. 2 and 3 are shown on Figure 2. Quarry No. 1 is not shown on Figure 2 but it is located approximately 1,200 feet west of Quarry No. 2. Although Quarry No. 4 reportedly never received WAL, this quarry was also investigated as part of the RI/FS.

In September 2000, the USEPA issued a Record of Decision (ROD) for the Crater site. The ROD requires various remedial activities including the construction of caps over Quarry Nos. 1 through 4. As outlined in the ROD, the caps must be constructed in accordance with the Commonwealth of Pennsylvania's Residual Waste Management Regulations for final cover of Class 1 residual waste landfills as set forth in 25 Pa. Code Sections 288.234 and 288.236-237 (ROD, page 7).

This report includes: (1) a summary of the remedial activities that have already been completed or will be completed on portions of Quarry No. 4 to satisfy the capping requirements set forth in 25 Pa. Code Sections 288.234 and 288.236-237; and (2) a request to modify the cap and drainage layer requirements for the remaining portions of the quarry.

This report is divided into four sections. Section 1.0 presents this Introduction to the report. Pertinent background information regarding previous investigations completed within and adjacent to Quarry No. 4 are provided in Section 2.0. The capping activities that have been completed or will be completed on certain portions of the quarry and which satisfy the requirements of 25 Pa. Code Sections 288.234 and 288.236-237 are presented in Section 3.0 and Section 4.0 includes a request for a modification, in accordance with 25 Pa. Code Section 288.234(b), to the cap and drainage layer requirements for the remaining portions of the quarry.

2.0 BACKGROUND INFORMATION

2.1 History of Quarry No. 4

Existing information suggests that Quarry No. 4 was mined for sand and gravel from sometime in the 1800s until the early 1900s. Based on a review of historical aerial photographs, the quarry was inactive and filled with water between at least 1945 and 1959. Quarry No. 3, which is located off-site and south and west of the Site, is visible in the 1959 photograph. Quarry No. 3 is filled or partially filled with a liquid, which appears darker than the water present in Quarry No. 4 or the water present in several other ponds located further east and south of Quarry No. 4. The lighter color of the water in Quarry No. 4 and the ponds further to the east and south compared to the darker color of the liquid in Quarry No. 3 is likely associated with the fact that WAL was being pumped into Quarry No. 3 at this time whereas there is no evidence to suggest that WAL was ever pumped into Quarry No. 4.

A 1965 aerial photograph shows that Quarry No. 4 was being filled with what appears to be earthen material. There may have been some water still present in the center of the quarry at this time. Between 1965 and 1975, it appears that the quarry was being actively filled with earthen material. By 1980, the quarry appears to have been filled to grade. The 1980 photograph shows that there is vegetation present on the surface of the quarry and there are also dirt access roads present in the central portion of the quarry and along its southeast end. There appears to have been some minor filling/grading taking place on the surface of the quarry in 1985. No activities were evident on the quarry in 1990 or 1995. By 1995, the surface of the quarry was covered with vegetation. The elevation of the surface of the backfilled quarry generally ranges from about 127 feet to 130 feet above mean sea level. Based on the above, it appears that fill materials have been in place in the quarry for approximately 35 years.

2.2 Results of Soil Samples Obtained from Quarry No. 4

There have been three investigations of the contents of Quarry No. 4 since the early 1990s. The first investigation was performed in 1993 by Pennoni Associates, Inc. (Pennoni). As part of this investigation, Pennoni installed four soil borings in the quarry. These borings were designated PB-1, and PB-3 through PB-5. Boring PB-1 was completed at a depth of 32 feet below the ground surface (BGS), boring PB-3 was completed at a depth of 52 feet BGS, boring PB-4 was completed at a depth of 72 feet BGS, and boring PB-5 was completed at a depth of 52 feet BGS. The approximate locations at which these borings were installed are shown on Figure 2. The borings were installed using a hollow-stem auger drilling rig. To evaluate the materials within and immediately below the quarry, Pennoni selected and submitted four samples for laboratory analysis. The samples selected for analysis were collected as follows: 1) from 27 to 29 feet BGS in boring PB-1; 2) from 10 to 12 feet BGS in boring PB-3; 3) from 35 to 37 feet BGS in boring PB-4; and 4) from 50 to 52 feet BGS in boring PB-5. The four samples were analyzed for the Target Compound List (TCL) organics (i.e., volatile and semi-volatile organic compounds and pesticides/PCBs) and the Target Analyte List (TAL) inorganics (i.e., metals and cyanide).

The USEPA completed a Remedial Investigation/Feasibility Study (RI/FS) of the Crater site between 1996 and 1999. Quarry Nos. 1 through 3, which received WAL were the primary focus

of the RI/FS. As shown on Figure 2, these quarries are located south and west of the 2201 and 2301 properties. Although Quarry No. 4 never reportedly received WAL, which is supported by the results of the analysis of soil and groundwater samples obtained within/adjacent to the quarry, Quarry No. 4 was investigated as part of the RI/FS. As part of the RI/FS investigation, six soil samples were collected from Quarry No. 4. These samples were designated Q4-1 (0 to 0.5 feet BGS), Q4-2 (0 to 0.5 feet BGS), Q4-B-1 (18 to 20 feet BGS), Q4-B-1 (78 to 80 feet BGS), Q4-B-2 (6 to 8 feet BGS), and Q4-B-2 (40 to 42 feet BGS) and were collected from the approximate locations shown on Figure 2. Soil samples Q4-1 and Q4-2 were collected directly from the surface of the quarry with the remaining four samples collected at depth from two soil borings (Q4-B1 and Q4-B2) installed using a hollow-stem auger drilling rig. Boring Q4-B1 was completed at a depth of 80 feet BGS and boring Q4-B2 was completed at a depth of 42 feet BGS. The six soil samples were analyzed for the TCL organics (i.e., volatile and semivolatile organic compounds and pesticides/PCBs) and the TAL inorganics (i.e., metals and cyanide).

In 1998, Penn E&R was retained by LPT to complete a further investigation of Quarry No. 4. As part of this investigation, Penn E&R installed eight test trenches and two soil borings in the quarry. The test trenches were designated T-1 through T-8 and the borings SB-1 and SB-2. The test trenches were generally excavated to a depth of 15 feet BGS and borings SB-1 and SB-2 were completed at depths of 69 feet and 82 feet BGS, respectively. These test trenches and borings were installed at the approximate locations shown on Figure 2. To evaluate the quality of the contents of the quarry, Penn E&R submitted twelve soil samples for laboratory analysis. These samples were designated SB-1 (14 to 16 feet BGS), SB-1 (55 to 57 feet BGS), SB-2 (10 to 12 feet BGS), SB-2 (42 to 44 feet BGS), Q4-T1 (2 feet BGS), Q4-T2 (2 feet BGS), Q4-T3 (2 feet BGS), Q4-T4 (2 feet BGS), Q4-T5 (2 feet BGS), Q4-T6 (15 feet BGS), Q4-T7 (13 feet BGS), and Q4-T8 (2 feet BGS). These twelve samples were analyzed for the TCL volatile and semivolatile organic compounds and the TAL inorganics. In addition, four of the samples (the SB designated samples) were also analyzed for pesticides and PCBs.

The results of the analysis of the twenty-two soil samples collected from Quarry No. 4 as part of the aforementioned investigations are summarized in Table 1. In evaluating the soil sample analytical data, the results were compared to USEPA Region III soil-to-groundwater Soil Screening Levels (DAF-20) and non-residential, used-aquifer, soil-to-groundwater Medium Specific Concentrations (MSCs) developed pursuant to Pennsylvania's Land Recycling and Environmental Remediation Standards Act (Act 2). A discussion of the results of the analysis of these soil samples is provided below.

Volatile Organic Compounds

No volatile organic compounds were detected above their Act 2 MSCs in the twenty-two soil samples collected from Quarry No. 4. Also, with the exception of trichloroethene (TCE) and tetrachloroethane (PCE) in one sample, no volatile organic compounds were detected above their USEPA soil-to-groundwater Soil Screening Levels (SSL). TCE and PCE were detected just above their USEPA SSL of 0.015 milligrams per kilogram (mg/kg) and 0.048 mg/kg, respectively, in the sample collected from 18 to 20 feet BGS at sample location Q4-B-1.

It should be noted that these compounds were not detected above USEPA SSLs in the deep sample collected from boring Q4-B-1. These results suggest that neither TCE nor PCE is being mobilized by conditions in Quarry No. 4 as they are not being leached from the shallow to the deep soils in the quarry. Additionally, as discussed below in Section 2.3, no volatile organic compounds were detected above Act 2 MSCs or USEPA Maximum Contaminant Levels (MCL) in the wells located hydraulically downgradient of Quarry No. 4. Based on these results, no volatile organic compounds are being leached from the materials in Quarry No. 4 to the groundwater at unacceptable levels.

Semivolatile Organic Compounds

No semivolatile organic compounds were detected above their Act 2 MSCs in the twenty-two soil samples collected from Quarry No. 4. Also, with the exception of benzo(a)anthracene in one of the twenty-two samples, benzo(a)pyrene in two of the twenty-two samples, and naphthalene in three of the twenty-two samples, no semivolatile organic compounds were detected above their USEPA SSL. As discussed below in Section 2.3, none of these compounds were detected in the monitoring wells located hydraulically downgradient of the quarry. These results suggest that no semivolatile organic compounds are being leached from the materials in Quarry No. 4 to the groundwater at unacceptable levels.

Pesticides/PCBs

No pesticides or PCBs were detected above either Act 2 MSC or USEPA SSL in the soil samples obtained from Quarry No. 4.

Inorganics

Metals

With the exception of lead, no metals were detected above their Act 2 MSCs in the twenty-two soil samples collected from Quarry No. 4. (The USEPA has not established a SSL for lead.) Only three of the twenty-two samples collected from Quarry No. 4 exhibited lead above its Act 2 non-residential soil-to-groundwater MSC of 450 mg/kg. Moreover, the average lead concentration for samples obtained from Quarry No. 4 of 259 mg/kg is well below its Act 2 non-residential MSC of 450 mg/kg. Also, it should be noted that lead concentrations generally decrease with sample collection depth. In fact, no samples collected below a depth of 16 feet BGS displayed a lead level above its Act 2 non-residential soil-to-groundwater MSC of 450 mg/kg. There were seven samples collected below 25 feet that did not display lead above its Act 2 non-residential soil-to-groundwater MSC. These results suggest that lead is not being mobilized by conditions in Quarry No. 4 as it is not being leached from the shallow to the deep soils in the quarry. Based on these results, the soils in Quarry No. 4 are not expected to be a source for lead in the groundwater.

With the exception of arsenic, manganese, and thallium, no metals were detected above their USEPA SSLs in the twenty-two soil samples collected from Quarry No. 4. The metals arsenic,

manganese, and thallium were detected above their USEPA SSL in some of the soil samples obtained from Quarry No. 4.

Arsenic was detected above its USEPA SSL of 0.026 mg/kg in each of the twenty-two soil samples obtained from Quarry No. 4. It is Penn E&R's opinion that the USEPA SSL of 0.026 mg/kg for arsenic is likely much lower than naturally occurring background levels for arsenic in the soils in this portion of Pennsylvania. This is supported by the fact that seven of the nine background samples collected as part of the RI/FS exhibited arsenic levels above its USEPA SSL. Even so, and as discussed below in Section 2.3, arsenic was not detected above its USEPA MCL of 50 micrograms per liter (ug/l) in the monitoring wells located hydraulically downgradient of Quarry No. 4. As indicated above, arsenic was not detected above its Act 2 non-residential soil-to-groundwater MSC of 150 mg/kg in any of the twenty two soil samples collected from Quarry No. 4. These results indicate that arsenic is not and will not be leached from the soil in Quarry No. 4 to the groundwater at unacceptable levels.

Manganese was detected above its USEPA SSL of 950 mg/kg in several soil samples obtained from Quarry No. 4 as well as in at least one sample collected from each of off-site Quarry Nos. 1, 2, and 3. Manganese was detected above its USEPA secondary drinking water standard of 50 ug/l in the monitoring wells located hydraulically downgradient of Quarry No. 4 and in the wells located downgradient of off-site Quarry Nos. 2 and 3 (i.e., wells MW-11S and MW-11D, MW-12 and MW-13S and MW-13D on Figure 2). The highest manganese concentration (34,000 ug/l) was detected in well MW-13D, which is located adjacent to and downgradient of off-site Quarry No. 2 but well upgradient of Quarry No. 4. Also, a water sample collected from saturated sediments in Quarry No. 3 exhibited a manganese concentration of 11,700 ug/l. These results suggest that off-site Quarry Nos. 2 and 3 are the likely primary source for the elevated manganese levels detected in the groundwater. The PADEP does not have an Act 2 soil-to-groundwater MSC for manganese.

Only five of the twenty-two soil samples collected from Quarry No. 4 exhibited thallium levels that exceeded the USEPA SSL of 3.6 mg/kg. The average thallium concentration for the twenty-two soil samples collected from Quarry No. 4 was below its USEPA SSL. Also, thallium was not detected above its Act 2 non-residential soil-to-groundwater MSC in any of the twenty-two soil samples obtained from Quarry No. 4. As discussed below in Section 2.3, with the exception of thallium in one well, the results of which Penn E&R believes were biased high by field sampling and preservation techniques, thallium was not detected in the monitoring wells located hydraulically downgradient of Quarry No. 4. These results indicate that thallium is not and will not be leached from the soil in Quarry No. 4 to the groundwater at unacceptable levels.

Cyanide (total)

Cyanide was not detected above either its Act 2 MSC or USEPA SSL in the twenty-two soil samples obtained from Quarry No. 4.

TCLP Test Results

A soil sample collected from Quarry No. 4 by Penn E&R was analyzed using the Toxicity Characteristic Leaching Procedure (TCLP) test method. The TCLP extract was subsequently analyzed for the metals silver, arsenic, barium, cadmium, chromium, copper, mercury, nickel, lead, selenium, and zinc. The results of the analysis of the extract revealed that none of the metals were detected in the leachate. These results suggest that, even under the very acidic conditions of the TCLP test method, the metals present in the soils in Quarry No. 4 would not leach into the groundwater.

2.3 Groundwater Conditions Hydraulically Downgradient of Quarry No. 4

Based on the results of the RI/FS, groundwater flow in the vicinity of Quarry No. 4 is believed to be primarily to the east as shown on Figure 2. The wells installed as part of the RI/FS that are located closest to and hydraulically downgradient of Quarry No. 4 include wells MW-17S, MW-17D, and MW-18. The locations of these wells in relationship to Quarry No. 4 are shown on Figures 1 and 2. (Figures 1 and 2 also show the approximate locations of off-site well clusters MW-11 and MW-13 and well MW-12.) Wells MW-17S, MW-17D, and MW-18 as well as the other wells installed as part of the RI/FS were sampled in January 1998. The samples obtained from these wells were analyzed for the TCL volatile and semivolatile organic compounds and the TAL Inorganics (i.e., metals and cyanide). The samples were analyzed for both total and dissolved metals.

The results of the analysis of the groundwater samples are summarized in Table 2. As shown on Table 2, the results were compared to USEPA MCLs and Act 2 non-residential, used-aquifer, MSC for groundwater. A discussion of the results of the analysis of these groundwater samples is provided below.

Volatile Organic Compounds

A review of Table 2 reveals that no volatile organic compounds were detected above either USEPA MCLs or Act 2 MSCs in the three groundwater samples collected hydraulically downgradient of Quarry No. 4.

Semivolatile Organic Compounds

A review of Table 2 reveals that no semivolatile organic compounds were detected above either USEPA MCLs or Act 2 MSCs in the three groundwater samples collected hydraulically downgradient of Quarry No. 4.

Inorganics

Cyanide (Total)

A review of Table 2 reveals that cyanide was not detected above either its USEPA MCL or PADEP MSC in the three groundwater samples collected hydraulically downgradient of Quarry No. 4.

Dissolved Metals

With the exception of manganese, no dissolved metals were detected above their USEPA MCLs or Act 2 MSCs in the three wells located hydraulically downgradient of Quarry No. 4. Manganese was detected above its USEPA secondary drinking water standard of 50 micrograms per liter (ug/l) in the wells MW-17S and MW-18, both of which are located hydraulically downgradient of Quarry No. 4. It should be noted that manganese was also detected in the wells located downgradient of off-site Quarry Nos. 2 and 3. In fact, the highest dissolved manganese concentration (34,000 ug/l) was detected in well MW-13D, which is located adjacent to and downgradient of off-site Quarry No. 2 (see Figure 2) but well upgradient of Quarry No. 4. Also, as indicated earlier, a water sample collected from saturated sediments in Quarry No. 3 as part of the RI/FS (sample Q3-1L) exhibited a manganese concentration of 11,700 ug/l. These results suggest that off-site Quarry Nos. 2 and 3 are the likely primary source for the elevated manganese levels detected in the groundwater.

Total Metals

The total metals aluminum, antimony, beryllium, cadmium, chromium, iron, lead, manganese, mercury, nickel, thallium, vanadium, and zinc were detected above their USEPA MCL/PADEP MSC in at least one of the three wells located hydraulically downgradient of Quarry No. 4. With the exception of manganese, lead and thallium, these metals were not detected above their USEPA SSL or Act 2 MSC in the twenty-two soil samples collected from Quarry No. 4. Therefore, there is no potential for these metals to have been leached into the groundwater from Quarry No. 4 soils. Also, as indicated above, these metals were not detected above their USEPA MCL/PADEP MSC in the dissolved phase in the three wells located hydraulically downgradient of Quarry No. 4. As discussed below, Penn E&R believes that the elevated total metal results may have been biased high as a result of field sampling and preservation techniques used to collect the groundwater samples.

Total manganese was detected above its USEPA secondary drinking water standard in the monitoring wells located hydraulically downgradient of Quarry No. 4. As indicated above, manganese was also detected in the wells located downgradient of off-site Quarry Nos. 2 and 3. The highest manganese concentration (33,600 ug/l) was detected in well MW-13D, which is located adjacent to and downgradient of off-site Quarry No. 2 but well upgradient of Quarry No. 4. These results suggest that Quarry No. 2 is the likely primary source for the elevated manganese levels detected in the groundwater and not Quarry No. 4.

Total lead was detected above its USEPA MCL and PADEP MSC in the three wells located hydraulically downgradient of Quarry No. 4. As indicated in Section 2.2, the average lead concentration for soil samples obtained from Quarry No. 4 of 259 mg/kg is well below its Act 2 soil-to-groundwater MSC. Also, lead concentrations in the soil samples obtained from Quarry No. 4 generally decrease with depth, which suggest that lead is not being mobilized by conditions in Quarry No. 4. In conjunction with the soil sample results, the fact that lead was not detected above its USEPA MCL/PADEP MSC in the dissolved phase suggests that the soil in Quarry No. 4 is not the source for the total lead detected in the groundwater. As discussed below, Penn E&R believes that the total metal results were biased high as a result of field sampling and preservation techniques. Therefore, the dissolved lead results, rather than the total lead results, more accurately represent groundwater conditions hydraulically downgradient of Quarry No. 4.

Total thallium was detected above its USEPA MCL in one of the three monitoring wells located hydraulically downgradient of Quarry No. 4. Total thallium was detected at a higher concentration in the well located downgradient of off-site Quarry No. 2. These results suggest that Quarry No. 2 is the likely primary source for the elevated total thallium levels detected in the groundwater and not Quarry No. 4.

Total Versus Dissolved Metal Results

As indicated above, the groundwater samples collected during the RI/FS were analyzed for both "total" and "dissolved" metals. With the exception of manganese in wells MW-17S and MW-18, none of the "dissolved" metals were detected above USEPA MCL/PADEP MSC in the wells located hydraulically downgradient of Quarry No. 4. As discussed in Section 3.0 of the Remedial Investigation report developed for the Crater site, the water samples collected from some of the monitoring wells were very turbid and, thus, had a high concentration of suspended soil. The Remedial Investigation report suggested that the turbid samples are likely the cause of the appearance of elevated "total" metals in the groundwater. Penn E&R agrees with this conclusion and suspects that the "total" metal results may have been biased high due to a combination of the turbid water samples and the sampling and preservation procedures used to collect the samples. The samples analyzed for "total" metals were not filtered prior to being preserved with acid. As a result, metals that are naturally occurring in the material suspended in the samples could be leached into the groundwater by the addition of the preservation acid, thereby biasing the sample results and making it appear that the groundwater contains those metals. In contrast, the samples analyzed for "dissolved" metals are filtered prior to being preserved with acid. As such, a majority of the suspended material, which would be present in a turbid groundwater sample, has been removed prior to being preserved with acid and prior to being analyzed for dissolved metals.

A good example of how a turbid sample can be affected by sample collection and preservation techniques is comparison of the "total" and "dissolved" metals results for the groundwater sample collected from well MW-17D (see Table 2). The "total" results for this sample indicate that seven metals are present in the groundwater at levels that exceed their USEPA MCL/PADEP MSC. However, no metals were detected above USEPA MCL/PADEP MSC when the same sample was analyzed for "dissolved" metals. This very significant difference is most likely

associated with the turbidity of the sample and the subsequent methods that were used to preserve the sample prior to analysis.

2.4 Cinder/Slag Fill Area

As part of LPT's due diligence survey, an area of fill material was identified in the northwest portion of the 2201/2301 property. The approximate location of this fill area is shown on Figure 2. As part of the investigation of this material, the results of which were provided to the USEPA during a project status meeting on April 8, 1998, over ten test trenches were installed into this area. Based on information obtained from the test trenches, the material in this area consists primarily of glass, ash, cinders, and slag. The surface expression of the fill encompasses an area about 150 long by 200 feet wide and the fill is up to 10 feet thick in some areas. There is approximately 3,000 cubic yards of fill located in this area. The source of the fill is not known, however, based on historical aerial photographs, it was placed in this area prior to 1959.

To evaluate the chemical makeup of the fill, Penn E&R collected a grab soil sample from one of the test trenches. This sample was collected from material that appeared to be most representative of the fill and from an area where elevated PID readings were detected. The sample was designated FT-3 and was collected at the approximate location shown on Figure 2. The sample was analyzed for the TCL volatile and semivolatile organic compounds and the TAL inorganics (i.e., metals and cyanide).

The results of the analysis of this sample are summarized in Table 3. In evaluating the fill sample results, the data were compared to Act 2 non-residential soil-to-groundwater MSCs and USEPA SSL. A review of Table 3 shows that no volatile or semivolatile organic compounds are present in the fill above Act 2 MSCs or USEPA SSL. With the exception of arsenic and lead, no metals are present in the fill above Act 2 non-residential soil-to-groundwater MSCs or USEPA SSL. The metal arsenic was detected above its very restrictive USEPA SSL of 0.026 mg/kg but not above its Act 2 MSC. Lead was detected above both its Act 2 MSC and USEPA SSL.

This fill area was not specifically addressed by the ROD because it was not identified by the Remedial Investigation as an area of concern related to the Crater Resources Superfund site. Nevertheless, LPT intends to cover and cap these fill materials. The portion of the site where the fill is located will be covered with an asphalt parking lot associated with the building being developed on the property. LPT plans to use the asphalt parking lot to cap the fill material. This cap will eliminate potential contact with the fill and will keep rain water from infiltrating through the material and potentially leaching contaminants into the groundwater, which is located at least 50 feet BGS in this portion of the site.

3.0 DEMONSTRATION OF COMPLETION OF REMEDIAL ACTIVITIES ON PORTIONS OF QUARRY NO. 4

As discussed earlier, the USEPA issued a ROD for the Crater site on September 20, 2000. The ROD requires the construction of a cap over Quarry No. 4. As outlined in the ROD, this cap must be constructed in accordance with the Commonwealth of Pennsylvania's Residual Waste Management Regulations for final cover of Class 1 residual waste landfills as set forth in 25 Pa. Code Sections 288.234 and 288.236-237. This Section of the report demonstrates attainment of the requirements set forth in 25 Pa. Code Sections 288.234 and 288.236-237 for specific portions of Quarry No. 4.

As shown on Figure 1, almost the entire eastern end of Quarry No. 4 has been covered with an impermeable 40-mil PVC liner installed as part of the construction of a permanent detention basin. In addition, a small portion of the western end of the quarry will also be covered with an impermeable 40-mil PVC liner installed to form another permanent detention basin. These areas are indicated in yellow on Figure 1. The 40-mil PVC liners in these areas meet the cap requirements set forth in 25 Pa. Code Section 288.234 (a) (1). The liners are/will be covered with soil and revegetated as required in 25 Pa. Code Section 288.236. The detention basins were designed so that erosion of the soil layer overlying the liner does not occur. Water in the dry eastern detention basin will drain to a natural swale located west of Quarry No. 4. Excess water from the western wet detention basin will drain into the same swale.

The surface elevation of Quarry No. 4 ranges from approximately 127 feet to 130 feet above mean sea level (MSL), with an average elevation of about 128.5 feet above MSL. The bottom of the eastern detention basin is at an elevation of about 132 feet above MSL. Therefore, up to 3 feet of soil was placed on top of the surface of the quarry prior to the installation of the 40-mil PVC linear in the eastern detention basin. The bottom of the western detention basin will be completed at an elevation of about 135 feet above mean sea level. Therefore, about 7 feet of soil will be placed on top of the quarry prior to the installation of the 40-mil PVC linear in the western detention basin.

In addition, a small portion of the southern end of the 2201 Building is located over Quarry No. 4 (the yellow colored area in the southwest portion of the building on Figure 1). Penn E&R believes that the building is an effective cap for the small portion of Quarry No. 4 over which it is located and meets and exceeds the requirements of 25 Pa. Code Sections 288.234 and 288.236-237. That is, no water will be able to infiltrate through the building into the underlying portion of Quarry No. 4. All water that collects on top of the building will be directed to the on-site detention basins that have been or will be capped in accordance with requirements of Sections 288.234 and 288.236-237. The elevation of the concrete pad on which the building is located is 151.50 feet above mean sea level. Therefore, over 20 feet of soil was placed on top of the quarry prior to the construction of the building.

4.0 REQUEST TO MODIFY THE CAP AND DRAINAGE LAYER REQUIREMENTS ON PORTIONS OF QUARRY NO. 4

As discussed in Section 3.0, almost the entire eastern end and a small portion of the west and northwest portions of Quarry No. 4 have been or will be capped in accordance with the requirements of 25 Pa, Code Sections 288.234 and 288.236-237. This section of the report contains a request for a modification of the cap and drainage layer requirements, pursuant to 25 Pa. Code Section 288.234(b), for the remaining portions of Quarry No. 4 (the blue shaded areas within the quarry as shown on
Figure 1).

The portions of the quarry for which this modification is being requested (blue shaded areas on Figure 1) will be covered with at least one foot of soil. However, a majority of the portion of the Quarry located on the 2201 property, which includes over 80 percent of the quarry, has been or will be, upon completion of the on-site construction activities, covered with over three feet of soil. Also, the north central portion of Quarry No. 4 is covered with over 12 feet of soil and is further capped by an asphalt parking lot. The soil cover placed over the portions of the quarry for which this modification is being requested will be graded in accordance with 25 PA Code Section 288.234 (f) and will be sloped such that water drains from the soil cover to a natural drainage swale located south and west of Quarry No. 4. The soil cover will be revegetated in accordance with 25 Pa. Code 288.236.

Prior to any construction activities, the filled surface elevation of Quarry No. 4 generally ranged from about 127 feet to 130 feet above mean sea level (MSL). The quarry surface was generally flat and, as such, did not promote the runoff of rain water. In fact, there was a small pond located at the western end of the quarry. Therefore, it is likely that a majority of rain water or surface water that made its way onto the surface of the quarry infiltrated into rather than running off of the quarry as overland flow.

A majority of the on-site portions of Quarry No. 4 have been or will be covered with over 3 feet of soil. This soil cover will be graded and sloped to ensure that rain water is generally directed away from the quarry. The increased slope of the soil cover placed over the quarry will ensure that much more rain water will runoff the quarry than would have prior to the installation of the soil cap. This is especially evident when you compare the slope of the surface of the quarry prior to the installation of the soil cap, which was about 2 percent in the central portion of the quarry, to the slope of the soil cover in the central portion of the quarry after its installation, which is about 12 percent. Construction elevations over Quarry No. 4 will range from 150 feet to 128 feet above MSL. In addition to the soil cover limiting infiltration of rain water and increasing runoff from the quarry, the other site features that have been or will be developed, such as the building, asphalt parking lot, and the lined detention basins, will also direct rain water off of the surface of the quarry.

The graded slope over Quarry No. 4 will be revegetated with grass in accordance with 25 Pa. Code 288.236. This revegetation is expected to promote increased transpiration of precipitation as compared to the pre-construction surface features of the quarry.

Penn E&R believes that this request for a modification to the cap and drainage lay requirements for the blue shaded areas shown on Figure 1 is warranted because it necessary to limit infiltration into the quarry (in accordance with 288.234[b]) and unacceptable leaching of contaminants from the materials in Quarry No. 4 to the g occurring as documented below.

Didn't the RDI conclude that it was necessary to limit infiltration into Q4?

1. There is no direct evidence to indicate that Waste Ammonia Liquid was ever d discharged into Quarry No. 4, unlike off-site Quarry Nos. 1 through 3. This conclusion is supported by the soil and groundwater analytical data generated for Quarry No. 4.

2. As detailed in Section 2.2, analytical results suggest that soils used to fill Quarry No. 4 generally meet USEPA SSL and PADEP soil-to-groundwater MSCs. In the few cases where a specific USEPA SSL was exceeded in the soil samples (no Act 2 soil-to-groundwater MSCs were exceeded), these compounds decreased in concentration with depth and were generally not detected in groundwater above USEPA MCLs or Act 2 MSCs downgradient of the quarry. These results suggest that potential contaminants in the quarry are not being mobilized by conditions in Quarry No. 4 as they are not being leached from the shallow to the deep soils or into the groundwater at unacceptable levels.

3. No compounds of concern have been detected above USEPA MCLs or PADEP MSCs in the groundwater hydraulically downgradient of the quarry which are attributable to the materials used to backfill Quarry No. 4.

4. Quarry No. 4 has remained uncovered for approximately 35 years after it was filled. Historical water infiltration into the quarry is evidence by its generally flat surface and the ponding of water. Penn E&R believes that if potential contaminants in the quarry have not been mobilized by conditions in Quarry No. 4 thus far, they will not be in the future.

5. A majority of the on-site portions of the quarry will be covered with over 3 feet of soil, which will limit the infiltration of water into the quarry. In addition, the slope of the soil cover, its revegetation, and the facilities constructed at the Site will enhance the runoff and transpiration of surface water and rain water from the quarry.

ORIGINAL

TABLE 2
SUMMARY OF ANALYTICAL RESULTS
FOR GROUND WATER SAMPLES
OBTAINED FROM WELLS LOCATED
DOWNGRADIENT OF QUARRY NO. 4[1]

ANALYTICAL PARAMETERS	SAMPLE DESIGNATION/ANALYTICAL RESULTS[2]			PADEP RUA MSC[3]	USEPA MCL[4]
	MW-17D	MW-17S	MW-18S		
Volatiles:					
Acetone	19 6J	5.0J	3.0UJ	3,700	NSA
Carbon Disulfide	0.68	0.50U	0 50U	1,900	NSA
Methylene Chloride	0 13B	1.1B	0.50U	5	5
Chloroform	0 12J	1 0	0.50U	100	80
2-Butanone	6.7J	3.0UJ	3.0UJ	2,800	NSA
Benzene	1 2	0 50U	0.50U	5	5
Toluene	0 86	1 2J	0 50U	1,000	1,000
Ethylbenzene	0.15J	0.50U	0.50U	700	700
Total Xylenes	0.52J	0.50U	0.50U	10,000	10,000
Semivolatiles:					
Phenol	4J	10U	10U	4,000	4[5]
2-Methlphenol	0 6	10U	10U	NSA	NSA
4-Methylphenol	1	10U	10U	NSA	NSA
Napthalene	4	10U	10U	100	100[5]
Di-N-Butylphthalate	10U	10U	0.7B	3,700	NSA
Bis(2-ethylhexyl)phthalate	0.9	3B	1B	6	NSA
Carbazole	4J	10U	10U	NSA	NSA
Cyanide (total):	74 0	0.67U	0 67U	200	200
Metals (Dissolved):					
Aluminum	184	12.8U	12.8U	200	NSA
Arsenic	2.2U	2.2U	2.2U	50	NSA
Barium	95.4	111B	126B	2,000	NSA
Beryllium	0 2UL	0 2UL	0.2UL	4	NSA
Cadmium	0.4UL	0 4UL	0.4UL	5	NSA
Calcium	14,900	41,800	63,900	NSA	NSA
Chromium	17 6	1 1U	1.6	100	NSA
Cobalt	4 3B	5 2B	4 8B	2,200	NSA
Copper	9 7	1 6U	4.7	1,000	NSA
Iron	152	8.8U	48.3	300	NSA
Lead	2 3UL	2 3UL	2 3UL	5	NSA
Magnesium	3,460	4,910	2,400	NSA	NSA
Manganese	18 4	**458**	**215**	50	NSA
Mercury	0.10U	0.21B	0.23	2	NSA
Nickel	5 0B	3.5	6 1B	100	NSA
Potassium	90,700	5,660	2,260	NSA	NSA
Selenium	9.9L	8 0L	21 6L	50	NSA
Sodium	56,600	29,400	5,120	NSA	NSA
Thallium	4 2U	4 2U	4 2U	2	NSA
Vanadium	1 5B	1 6B	1.7B	2	NSA
Zinc	37 1	10 6	155	2,000	NSA
Metals (total):					
Aluminum	**24,400**	**3,060**	**1,230**	NSA	200
Antimony	**14.0B**	**11.5B**	**12.3B**	NSA	6
Arsenic	**40.1**	5 0B	**5.8B**	NSA	5
Barium	**450**	133	54.0	NSA	200
Beryllium	**245**	0.59L	0 22UL	NSA	4
Cadmium	**29.4**	0 44UL	0.44UL	NSA	5

ORIGINAL

TABLE 2
SUMMARY OF ANALYTICAL RESULTS FOR GROUND WATER SAMPLES OBTAINED FROM WELLS LOCATED DOWNGRADIENT OF QUARRY NO. 4[1]

ANALYTICAL PARAMETERS	SAMPLE DESIGNATION/ANALYTICAL RESULTS[2]			PADEP RUA MSC[3]	USEPA MCL[4]
	MW-17D	MW-17S	MW-18S		
Calcium	635,000	169,000	64,600	NSA	NSA
Chromium	**126**	10.8	10 8	NSA	100
Cobalt	1,010J	58 8J	3.2B	NSA	NSA
Copper	605	23 7	13 1	NSA	1,300
Iron	**57,400**	**9,330**	**9,400**	NSA	300
Lead	**499**	**102**	**17.5**	NSA	15
Magnesium	17,900	12,900	2,230	NSA	NSA
Manganese	**10,800**	**2,430**	**288**	NSA	50
Mercury	**4.3**	0.23B	0.23B	NSA	2
Nickel	**2,380**	53.3	6 4	NSA	100[5]
Potassium	139,000	5,960	2,110	NSA	NSA
Selenium	6 0UL	4.0UL	6.3B	NSA	50
Silver	8.1	2 1	1.6U	NSA	100[5]
Sodium	66,900	23,700	3,580	NSA	NSA
Thallium	**11.3L**	4 7UL	4.7UL	NSA	2
Vanadium	**35.2**	**4.9**	**8.8**	NSA	2
Zinc	**8,110**	85 8	72.2	NSA	5,000

Notes

(1) - Analytical results were obtained from a report prepared by Environmental Resources Management entitled "The Crater Resources Participating Parties Group, Remedial Investigation Report, Crater Resources Site", dated September 24, 1998

(2) - All results are reported in micrograms per liter Also, only those compounds detected above the laboratory detection limit are shown

(3) - Pennsylvania Department of Environmental Protection, Land Recycling and Environmental Remediation Standards Act, Residential Used-Aquifer, Medium Specific Concentration for Organic and Inorganic Substances in Ground Water, August 16, 1997

(4)- United States Environmental Protection Agency Drinking Water Standards, Maximum Contaminant Levels, Summer, 2000

(5)- No USEPA MCL was available for this compound This is a USEPA Lifetime Health Advisory Level

J - This result should be considered a quantitative estimate

B - (Organics) - This result is qualitatively invalid because the compound/analyte was also detected in a blank at a similar concentration

B - (Inorganics) - The result is between the estimated quantitation limit and the instrument detection limit

U - This analyte was not detected The numeric value represents the sample quantitation/detection limit for this analyte.

D - Determined in diluted sample

UJ - This analyte was not detected. The numeric value that represents the quantitation/detection limit for this analyte is a quantitative estimate

UL - This compound was analyzed but not detected. The numerical value that represents the quantitation limit of the compound is a biased low quantitative estimate

L - This result should be considered a biased low quantitative estimate

K - This result should be considered a biased high quantitative estimate

ND - None detected

PADEP - Pennsylvania Department of Environmental Protection

RUA - Residential Used Aquifer

MSC - Medium Specific Concentration

USEPA - United States Environmental Protection Agency

MCL - Maximum Contaminant Level

NSA - No Standard Available

Bold - This compound was detected above its USEPA MCL or PADEP MSC

TABLE 3

SUMMARY OF ANALYTICAL RESULTS FOR THE SAMPLE COLLECTED FROM THE SLAG/CINDER FILL AREA

ANALYTICAL PARAMETERS	SAMPLE DESIGNATION/ ANALYTICAL RESULTS[1] FT-3	PADEP NSRG MSC[2]	USEPA SG SSL[3]
Volatile Organics[4]:			
Methylene Chloride	0.012JB	0.5	0.019
Semivolatile Organics:			
Acenaphthylene	<0.44	4,400	NSA
Anthracene	<0.44	230	470
Benzo(a)anthracene	0.25J	320	1.5
Benzo(b)fluoranthene	0.34J	160	4.5
Benzo(k)fluoranthene	0.079J	600	4.5
Benzo(g,h,i)perylene	0.24JB	180	NSA
Benzo(a)pyrene	0.24JB	46	0.37
Bis(2-ethylhexyl)phthalate	0.39J	130	2,900
Carbazole	<0.44	NSA	NSA
Chrysene	0.27J	220	150
Dibenzo(a,h)anthracene	0.074J	160	1.4
Fluoranthene	0.34J	3,300	6,300
Fluorene	<0.44	380	140
Indeno(1,2,3-cd)pyrene	0.21J	28,000	22
Naphthalene	<0.44	10	0.15
Phenanthrene	0.13J	11,000	NSA
Pyrene	0.31J	220	680
Inorganics[4]:			
Aluminum	13800	NSA	NSA
Antimony	7.4B	27	13
Arsenic	**19.8**	150	0.026
Barium	996	8,200	2,100
Beryllium	0.54B	320	1,200
Cadmium	8.2	38	27
Calcium	29400	NSA	NSA
Chromium	67.5	190,000	$2x10^9$
Cobalt	16.4	610	NSA
Copper	401	36,000	11,000
Iron	75900	NSA	NSA
Lead	**2390**	450	NSA
Magnesium	4690	NSA	NSA
Manganese	744	NSA	950
Mercury	0.25	10	NSA
Nickel	92.0	650	NSA
Potassium	2100	NSA	NSA
Selenium	<0.72	26	19
Silver	3.1	84	31
Sodium	<52.5	NSA	NSA
Thallium	0.78B	14	3.6

SUMMARY OF ANALYTICAL RESULTS FOR THE SAMPLE COLLECTED FROM THE SLAG/CINDER FILL AREA

ANALYTICAL PARAMETERS	SAMPLE DESIGNATION/ ANALYTICAL RESULTS[1] FT-3	PADEP NSRG MSC[2]	USEPA SG SSL[3]
Vanadium	28.0	580	5,100
Zinc	5620	12,000	14,000
Cyanide	<1.33	200	150

Notes:

(1) - All results are in milligrams per kilogram

(2) - Pennsylvania Department of Environmental Protection, Land Recycling and Environmental Remediation Standards Act (Act 2), Non-Residential Used Aquifer Soil-to-Ground Water Medium Specific Concentration (August 1997)

(3) - United States Environmental Protection Agency, Region III, RBC Table, Soil-to-Ground Water Soil Screening Levels , DAF-20 (April 2000)

(4) - Only those volatile or semivolatile organic compounds which were detected above the method limit are shown

PADEP - Pennsylvania Department of Environmental Protection

NRSG - Non-Residential Soil-to-Ground Water

MSC - Medium Specific Concentration

USEPA - United States Environmental Protection Agency

SG - Soil-to-Ground Water

SSL - Soil Screening Level

J - Compound was detected below the method detection limit and the reported concentration should be considered an estimate.

B - (Organics) - This results is qualitatively invalid because the compound/analyte was also detected in a blank at a similar concentration.

B - (Inorganics) - The result is between the estimated quantitation limit and the instrument detection limit

<0.44 - Compound was not detected above the listed method detection limit.

NSA - No Standard Available

Bold - Indicates compound was detected above either its PADEP MSC or USEPA SSL

SDMS US EPA Region III

Imagery Insert Form

Site Name: Crater Resources **Document ID:** 2050842

Some images in this document may be illegible or unavailable in SDMS. Please see reason(s) indicated below:

☐ ILLEGIBLE due to bad source documents. Images(s) in SDMS equivalent to hard copy.

Specify Type of Document(s) / Comments:

☐ Includes ____ COLOR or ____ RESOLUTION variations. Unless otherwise noted, these pages are available in monochrome. The source document page(s) is more legible than the images. The original document is available for viewing at the Superfund Records Center.

Specify Type of Document(s) / Comments:

☐ RESTRICTED CONFIDENTIAL BUSINESS INFORMATION (CBI-R):
Restricted or copyrighted documents that cannot be imaged.

Specify Type of Document(s) / Comments:

☑ UNSCANNABLE MATERIAL:
__V__ Oversized or ___ Format. Due to certain scanning equipment capability limitations, the document page(s) is not available in SDMS. The original document is available for viewing at the EPA Region 3 Superfund Records Center.

Specify Type of Document(s) / Comments:

MAP

☐ Document is available at the EPA Region 3 Superfund Records Center.

Specify Type of Document(s) / Comments:

ORIGINAL

NOTE:
(1) THE BOUNDARIES OF QUARRY NOs. 2, 3 & 4 ARE ONLY APPROXIMATE AND ARE BASED ON A REVIEW OF HISTORICAL AERIAL PHOTOGRAPHS

(2) THE SOIL BORINGS, TEST TRENCHES AND MONITORING WELL LOCATIONS ARE APPROXIMATE.

LEGEND (2)

- FT-3 — Fill Sample Location
- PB-4 — Pennoni 1993 Soil Sample/Boring Location
- Q4-1/Q4-B1 — ERM 1996/1997 Soil Sample/Boring Location
- SB-1/T-7 — Penn E&R, 1998 Test-Pit/Soil Sample Location
- MW-17S — Monitoring Well Location
- Assumed/Anticipated Direction of Ground Water Flow From Figure 19 In The ERM September 24, 1998 Remedial Investigation Report

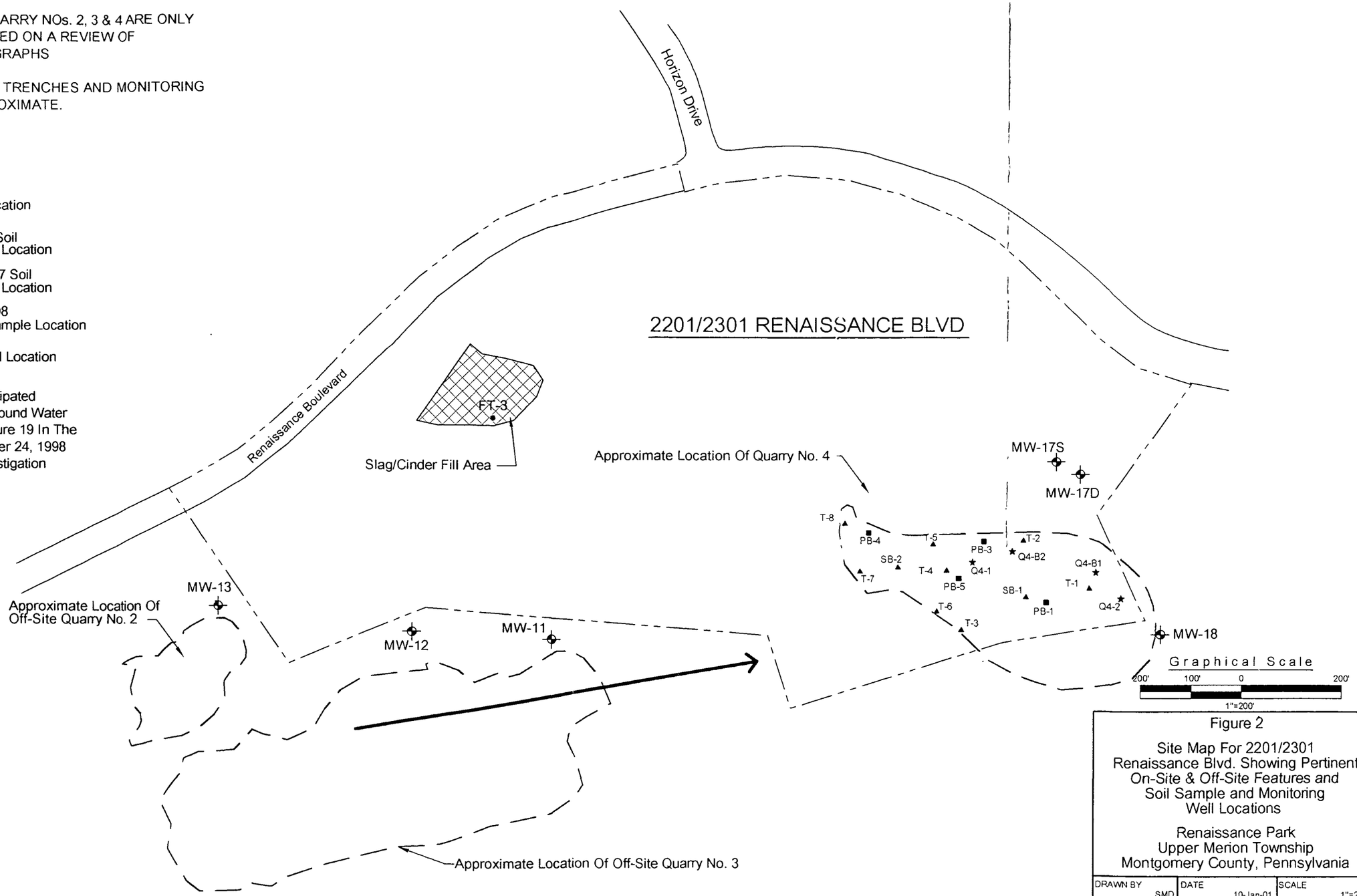


Figure 2

Site Map For 2201/2301 Renaissance Blvd. Showing Pertinent On-Site & Off-Site Features and Soil Sample and Monitoring Well Locations

Renaissance Park
Upper Merion Township
Montgomery County, Pennsylvania

DRAWN BY	DATE	SCALE
SMD	10-Jan-01	1"=200'±

Penn E&R
Environmental & Remediation, Inc
2755 Bergey Road
Hatfield, Pennsylvania 19440
215-997-9000 fax-215-822-8575

025-4206-01000